

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number  
WO 2005/013445 A1

(51) International Patent Classification<sup>7</sup>: H01S 3/067, 3/10

(21) International Application Number:  
PCT/GB2004/003330

(22) International Filing Date: 2 August 2004 (02.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0317952.0 31 July 2003 (31.07.2003) GB

(71) Applicant (for all designated States except US):  
SOUTHAMPTON PHOTONICS LIMITED [GB/GB];  
3 Wellington Park, Tollbar Way, Hedge End, Southampton  
SO30 2QU (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): ZERVAS, Mikhael, Nicholas [GR/GB]; 34 Hill Farm Road, Southampton, Hampshire SO15 5SR (GB). GHIRINGHELLI, Fabio [IT/GB]; 16 Bassett Crescent East, Bassett, Southampton SO16 7PB (GB).

(74) Agent: JONES, Graham, Jones; Graham Jones & Company, 77 Beaconsfield Road, Blackheath, London SE3 7LG (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AB, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

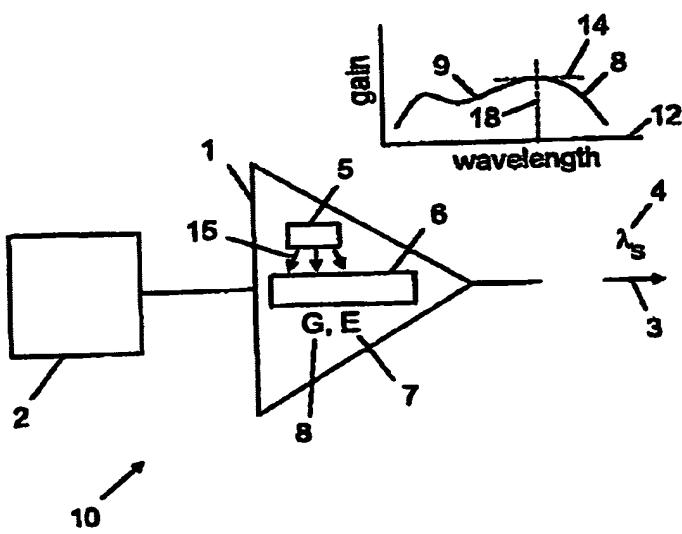
— of inventorship (Rule 4.17(iv)) for US only

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LD PUMPED FIBRE AMPLIFIER WITH SECOND RESONATOR OR INPUT SIGNAL FOR GAIN LIMITATION



(57) **Abstract:** Apparatus (10) for providing optical radiation (3) having a signal wavelength  $\lambda_s$  (4), which apparatus (10) comprises at least one pump (5) for providing pump radiation (15), a gain medium (6), and energy limiting means (2), in which the pump radiation (15) acts on the gain medium (6) to provide stored energy (7) and gain (8) for optical amplification, characterised in that the gain (8) has a maximum gain (14) at a wavelength (18) at which the maximum gain occurs (14), and the energy limiting means (2) limits the maximum gain (14) and the amount of stored energy (7) that is able to be stored to values below those at which the stored energy (7) will cause damage to the apparatus (10).